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Proximal or Distal Mercurial Inhibition of Succinic Dehydrogenase in the Kidney Tubules of Rat

In a recent histochemical paper (*1*) we reported that the administration of mercurophylline to rats resulted in an inhibition of the succinic dehydrogenase of the kidney, which was most pronounced in the thick ascending portions of Henle's loops. Later, Wachstein and Meisel (*2*) and Rennels and Ruskin (*3*) localized the inhibition of succinic dehydrogenase by mercuhydrin, another mercurial diuretic, in the proximal convoluted tubules. Wachstein and Meisel also stated that the ascending portions of Henle's loops retained their full activity. The highly divergent results prompted us to reinvestigate this question using both Novurit (*4*) (mercurophylline) and Mercuhydrin Sodium (*5*) as diuretics.

Blue tetrazolium (BT) and neotetrazolium (NT) were employed as histochemical indicators for the enzyme. The incubation mixtures were prepared according to Seligman and Rutenburg (*6*).

Mercurophylline in subcutaneous doses of 15 to 30 mg of Hg/kg of weight caused, within 24 hr, an almost complete inhibition of succinic dehydrogenase in the thick portions of Henle's loops, thus confirming our earlier results. This was seen both in BT- and NT-preparations (Fig. 1). The activity of the proximal convoluted tubules, especially of their straight terminal portions, was also clearly reduced. The distal convoluted tubules retained a little more of their activity.

In contrast, the administration of mercuhydrin in the same doses resulted in a very pronounced inhibition of succinic dehydrogenase in the proximal convoluted tubules, whereas the activity in the distal convoluted tubules, and especially in the thick portions of Henle's loops, was only slightly reduced, if at all (Fig. 1). These observations are in essential agreement with the results of previous investigators (*2, 3*).

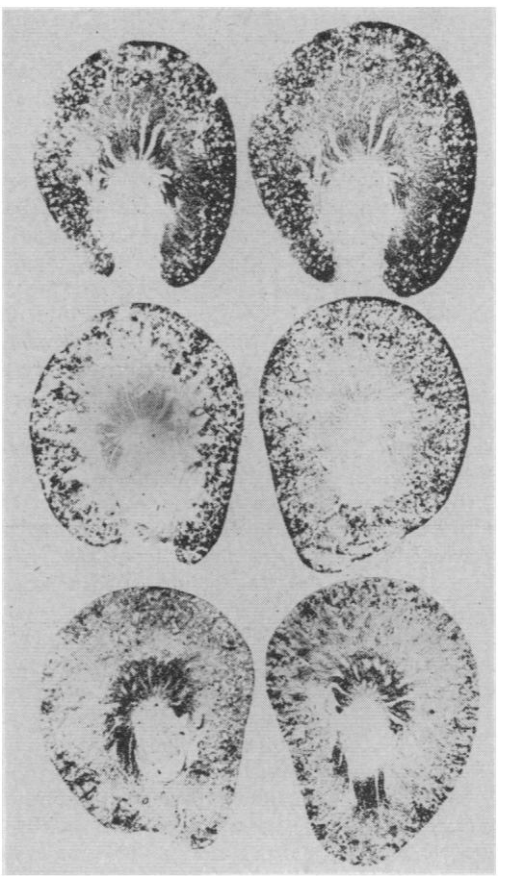

Fig. 1. BT-preparations on the left, NT-preparations on the right. Top, controls; middle, inhibition pattern by mercurophylline, 15 mg of Hg/kg of weight; bottom, inhibition pattern by mercuhydrin, 15 mg of Hg/kg of weight. Section thickness, 40μ.

Both of these diuretics contain the same amounts of mercury and theophylline. Therefore, the different organic components of these mercurials seem to be responsible for the difference in the enzymatic inhibition, probably by modifying their mode of excretion.

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